

ANNUAL REPORT

OF

THE KEEPER

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

AT HARVARD COLLEGE,

TO THE

PRESIDENT AND FELLOWS OF HARVARD COLLEGE

FOR

1900-1901.

CAMBRIDGE, U.S.A.:

UNIVERSITY PRESS: JOHN WILSON AND SON.

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LIBRARY

MUS. COMP. ZOOLOGY
CAMBRIDGE, MASS.

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1901.

MUSEUM OF COMPARATIVE ZOOLOGY.

Faculty.

CHARLES W. ELIOT, *President.*

HENRY P. WALCOTT.

GEORGE L. GOODALE.

— — —, *Curator.*

ALEXANDER AGASSIZ, *Secretary.*

Committee on the Museum.

HENRY P. WALCOTT.

GEORGE L. GOODALE.

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W. McM. WOODWORTH	<i>Keeper of the Museum.</i>
WALTER FAXON	<i>Assistant in Charge of Crustacea and Mollusca.</i>
SAMUEL GARMAN	<i>Assistant in Herpetology and Ichthyology.</i>
WILLIAM BREWSTER	<i>Assistant in Ornithology.</i>
ALPHEUS HYATT	<i>Assistant in Invertebrate Palaeontology.</i>
SAMUEL HENSHAW	<i>Assistant in Entomology and Librarian.</i>
C. R. EASTMAN	<i>Assistant in Vertebrate Palaeontology.</i>
OUTRAM BANGS	<i>Assistant in Mammalogy.</i>
FRANCES M. SLACK	<i>Librarian Emerita.</i>
MAGNUS WESTERGREN	<i>Artist.</i>

NATHANIEL S. SHALER	<i>Professor of Geology.</i>
WILLIAM M. DAVIS	<i>Sturgis-Hooper Professor of Geology.</i>
EDWARD L. MARK	<i>Hersey Professor of Anatomy.</i>
ROBERT T. JACKSON	<i>Assistant Professor of Palaeontology.</i>
GEORGE H. PARKER	<i>Assistant Professor of Zoölogy.</i>
ROBERT DEC. WARD	<i>Assistant Professor of Climatology.</i>
JAY B. WOODWORTH	<i>Assistant Professor of Geology.</i>

Instructors and Assistants in the Laboratories of Zoölogy and Geology.

WILLIAM E. CASTLE	<i>Instructor in Zoölogy.</i>
THOMAS A. JAGGAR, JR.	<i>Instructor in Geology.</i>
HERBERT W. RAND	<i>Instructor in Zoölogy.</i>
MOTTE ALSTON READ	<i>Instructor in Geology.</i>
JOSEPH E. WOODMAN	<i>Assistant in Geology.</i>
ROBERT S. BREED	<i>Assistant in Zoölogy.</i>
FREDERICK MASON WILDER	<i>Assistant in Meteorology.</i>
AMOS WILLIAM PETERS	<i>Assistant in Zoölogy.</i>
FREDERIC WALTER CARPENTER	<i>Assistant in Zoölogy.</i>

R E P O R T.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE:—

During the past academic year the regular courses in Zoölogy, Geology, Geography, and Meteorology were given in the Natural History Laboratories of the Zoölogical Section (Museum of Comparative Zoölogy) of the University Museum. It was hoped that the new southwest corner piece, the Geological Section, would be completed, so that the departments of Geology, Geography, and Meteorology would take possession, at the beginning of this academic year, of the laboratories and lecture rooms provided for them, and vacate the rooms now occupied, which are much needed by the Department of Zoölogy. As the building has not been completed, the routine work of instruction will begin as before.

Ten courses in Zoölogy were given by Professors Mark, Jackson, Parker, Drs. Castle and Rand, assisted by Messrs. Breed, Davis, Johnson, Ordway, and five Sub-Assistants. These courses were attended by two hundred and thirty-one students. Six courses in Zoölogy were given to forty-two students of Radcliffe College.

Eighteen courses under the Geological Department, were given by Professors Shaler, Davis, Jackson, Ward, J. B. Woodworth, Drs. Jaggar, Daly, and Mr. Woodman, assisted by Messrs. Boynston, Stone, Wilder, and five Sub-Assistants. The courses were attended by five hundred and forty-eight. Six courses were given to thirty-six students of Radcliffe College.

The Summer School of Geology, held in the Museum, was attended by thirty-three students in two courses, given by Mr. H. T. Burr, assisted by Mr. C. H. Morrill.

In recognition of his long service in successful administration of the instruction in Zoölogy under the Faculty of Arts and Sciences, Professor E. L. Mark has been appointed by the Corporation of the University Director of the Zoölogical Laboratory.

The principal addition to the exhibition collections has been a series of Japanese siliceous sponges for the Pacific room. A number of birds have been added to the faunal and systematic series, and a fine specimen of the Snow Leopard of Thibet has been placed in the Europæo-Siberian room. An additional case has also been constructed in this room. It is hoped that when the next report is issued the exhibit of palæozoic invertebrates will be open to the public, as considerable progress has been made in preparing the material for this exhibit. The Museum Assistants report the storage collections to be in excellent condition. In some departments the accessions have been of unusual value. Details of these accessions will be found in the special reports.

The installation of the large Bangs collection of mammals is now complete, and the old Museum collections have been incorporated with it in a separate room. Mr. Bangs has given much of his time to this work. A large and valuable series of South American mammals has been received from the Messrs. Bangs. The expenses of installing the Bangs collection were partly met by an appropriation of five hundred dollars from the Corporation of the University, applied toward the construction of storage cases.

Most important of the additions to the Department of Ornithology are the collections from the Hawaiian and Liu Kiu Islands. The latter collection contained a number of new forms, and has been reported on by Mr. Bangs in the "Bulletin" of the Museum.

There have been many gifts to the collection of recent invertebrates, among which are the Emerton collection of spiders, the series of American ants from Professor W. M. Wheeler. From Mr. F. Du Cane Godman, through the British Museum, there has been received a set of duplicates of the land and fresh-water Mollusca of the *Biologia Centrali-Americana*. A representative collection of the rich siliceous sponge fauna of Japan, has been received from Mr. Agassiz. This exceptionally fine material has been mounted, and forms part of the exhibit of the Pacific room. Mr. Agassiz has also given to the Museum a large collection of alcoholic Japanese Marine radiates. From the U. S. National Museum has been received a duplicate series of the "Albatross" (1891) ophiurans reported on by Lütken and Mortensen in the "Memoirs" of the Museum. The "Blake" Bathynomus material has been returned by Professor Bouvier, whose report will appear in the "Memoirs." The Museum leeches have been sent to Professor Percy Moore of Philadelphia for study.

Dr. Eastman has again gone West in the interests of the Museum. His expedition of last year resulted in important additions to our palæozoic fishes and he reports having secured valuable new material for his department.

The most important addition to the collections of the Museum is Mr. Agassiz's gift of the Davis and McConathy collections of palæozoic corals. The Davis collection comprises more than eight thousand lots, the majority of which are the types of Major Davis's work on the "Kentucky Fossil Corals." Major Davis spent two months at the Museum in installing these collections.

From Dr. J. M. Flint has been received a "Class Microscope" devised by him, and equipped with a rotary stage carrying about three hundred mounts of recent Foraminifera. The instrument is designed for exhibition purposes, and will be installed as soon as practicable.

Mr. Henshaw reports that the accessions to the library are greater than those recorded in recent years. A complete change has been made in the arrangement of the stacks, the large northwest room being devoted exclusively to serials arranged alphabetically under the geographical divisions adopted throughout the Museum. The two rooms of the Whitney Library have been assigned, one to geological and geographical serials and the other to the publications of geological surveys and to maps. Upwards of two hundred volumes and pamphlets treating of Ethnology have been transferred to the Peabody Museum, and nearly as many botanical works to the Gray Herbarium and the special libraries of the departments of Botany. Many duplicates have been transferred to the general library of the University. By a vote of the Council of the University Library upwards of five hundred geological volumes and pamphlets were transferred from Gore Hall to the library of the Museum. It is earnestly hoped that the officers of the central library will continue this policy and in time transfer to the museum stacks such books in other departments of natural history as are not on our shelves. Such a segregation would make the Museum library the most complete of its kind and one of the strongest departments of the University. It would facilitate the work of students, and add much to the utility of the books and efficiency of the Museum, since books on systematic natural history are of little use apart from the collections of which they treat.

From Walter Hunnewell, Esq., the Museum has received the

sum of five thousand dollars, given in memory of his son, Willard Peele Hunnewell, of the Class of 1904. By a vote of the Museum Faculty the income of this fund will be employed for the purchase of books on Entomology.

Eight numbers of the "Bulletin" were issued during the year, comprising 383 pages and 74 plates. No numbers of the "Memoirs" were published. The issues of the "Bulletin" include Dr. Stejneger's descriptions of lizards, No. XXVIII., "Albatross" expedition of 1891, and Mr. Andrew's report on his work for Mr. Agassiz on the geology of the Fiji Islands (Vol. XXXVIII., Geol. Ser., Vol. V.); two numbers of the "Bulletin" were Contributions from the Zoological Laboratory under Professor Mark. By a vote of the Faculty of the Museum an annual appropriation from the funds of the Museum was made toward publishing in the "Bulletin" original work of the officers and students in the department of Geology. Three such papers were published, in the fifth volume of the Geological Series of the "Bulletin," after a lapse of some years the department of Geology again taking part in the publications of the Museum. Mr. Frank Springer's Memoir on *Uintacrinus* is nearly ready for distribution, and several reports of Mr. Agassiz's "Blake," "Albatross," and "Tropical Pacific" Expeditions are in the hands of the printer. Volumes of XXXVII., XXXVIII., and XXXIX. of the "Bulletin" and XXV., XXVI., and XXVII. of the "Memoirs" are in course of publication. Other publications dealing wholly or in part with collections of the Museum are: Jules Bonnier's *Epicaridæ* (*Trav. Sta. Zoöl. Wimereux*), Gamble and Ashworth's *Arenicolidæ* (*Quar. Jour. Micr. Sci.*) and G. M. Allen's Louisiana Deer (*Amer. Naturalist*).

The Faculty of the Museum has granted me leave of absence for the winter to accompany Mr. Agassiz on his proposed expedition to the Maldives Islands. The islands of the Indian Ocean are the only groups of atolls remaining which Mr. Agassiz has not examined in his explorations for the study of coral formations. He has chartered a steamer from the British India Company which is to meet him at Colombo, Ceylon. It is expected that the work will occupy about two months.

W. McM. WOODWORTH,
Keeper of the Museum.

REPORT ON THE ZOOLOGICAL LABORATORY.

BY PROFESSOR E. L. MARK.

THE numbers of students in attendance on the several courses in Zoölogy, both in Harvard University and Radcliffe College, are given in the table which follows, the numbers for Radcliffe being in italics:—

Courses, 1900-01.	Grad.	Sen.	Jun.	Soph.	Fresh.	Spec.	Sci.	Total.
Zoölogy 1 . . .		10 2	19 5	32 8	24 4	9 2	28	122 21
“ 2 . . .	2	5 1	10 2	10 2	3 1	3 3	9	42 9
“ 3 . . .	4	4 1	3	3			5	19 1
“ 4 . . .	2	3 2	1	1			2	8 3
“ 5 . . .	3	3 1	1	1			3	10 2
“ 9 . . .	2						1	3
“ 10 . . .	3							3
“ 13 . . .	2	1					3	6
“ 16 . . .	3 2	1 3				1	4	8 6
“ 20 a . . .	8	1					1	10
Totals	29 2	28 10	32 9	47 10	27 5	12 6	56	231 42

Dr. Herbert W. Rand was appointed Instructor for the year 1900-01, and in addition to supervising the laboratory work in Courses 4 and 5 has had entire charge of Course 3. Dr. Castle has been made a member of the Faculty of Arts and Sciences; he will have charge of Courses 10 and 11, in addition to Course 2. Professor Parker gave for the first time a new half course (Zoölogy 13) on comparative histology, besides the courses which he gave in the preceding year. The names of the assistants in the various courses appear in connection with the statements about each course.

The number of lectures in Zoölogy 1 was slightly increased, lectures having been given regularly every other Saturday, instead

of occasionally on that day, in addition to the Tuesday and Thursday lectures. The laboratory work was revised, and a new outline printed. By change in the laboratory hours the student is now required to do the laboratory work of each week on three consecutive hours, or, at least, without other interruption than that necessitated by attendance on the lectures of the course. This regulation has made the supervision of the laboratory work more methodical and efficient than when students were allowed to separate the hours of attendance, and it is not known to have obliged any student to give up the course. Professor Parker had as Chief Assistant, Mr. R. S. Breed, and as Sub-Assistants, Messrs. H. S. Davis, J. M. Johnson, and T. Ordway. The course was taken as an "extra" by four students not enumerated in the table.

The laboratory work in Zoölogy 2 embraces the dissection and study of some ten or twelve types of animals, and varies somewhat from year to year, according to the selection of forms made for work in Zoölogy 1. The course was given substantially as in former years. Dr. Castle had as Chief Assistant, Mr. H. Crawley. Mr. W. P. Hager was Sub-Assistant during about three-fourths of the course, and Mr. G. M. Allen during one-fourth. Owing to the fact that none of the assistants had had previous experience in assisting in this course, the instructor was compelled to devote more time than he ordinarily does to personal supervision of the laboratory work.

The work in Zoölogy 4 was carried on as in former years. The laboratory was in charge of Dr. Rand, who also gave five lectures on the anatomy of *Glossiphonia*,—the animal used in studying various matters of technique. The remaining lectures of this course and those in Zoölogy 5 were given by Professor Mark. In the latter course Dr. Rand had charge of the laboratory work.

The courses in Experimental Morphology were resumed, Dr. Castle, who is to give both these courses, having begun with Zoölogy 10, Ontogenesis. In the lectures were discussed the physical and chemical peculiarities of living substance, and the effect upon it and its activities of various agents, such as chemical agents, heat, light, gravity, etc. The special topic of sex in animals and plants was also discussed at some length. Among the special topics for experimental work assigned to students were: acclimatization to high temperatures; the effects of increased and diminished atmospheric pressure; the effect of close breeding in the case of

some invertebrates; and certain questions connected with the determination of sex.

The half course, Zoölogy 13, on comparative histology, with special reference to the nervous tissues, was given for the first time. The study of epithelium as a primitive tissue was followed by that of the derived tissues, nerve and muscle. There were two lectures a week, and the students each made and studied twenty preparations involving the use of modern methods in muscle and nerve histology. Professor Parker gave the course, without the aid of an assistant.

In Zoölogy 16, carried on as usual by Professor Parker, laboratory work, opportunity for which was extended to a few students in the previous year, was made obligatory for all. It consisted in the investigation of special topics, one assigned to each student. Of the results from the eight topics assigned, three will probably be offered for publication. The lectures were attended by three graduate students not enrolled.

There were ten students engaged in research (Zoölogy, 20 a) under the supervision of the Director of the Laboratory. Three of these completed their work and, as candidates for the Doctor's degree, presented theses which were accepted. The theses of two others were nearly completed, and will be presented for acceptance early in the coming year.

Mr. G. M. Allen began studies on the degenerate eyes of some common mammals; Mr. R. S. Breed continued with excellent results his problem in insect metamorphosis; Mr. H. Crawley wrote a paper on the absorption of fat by a common newt, which secured one of the Boylston Prizes offered by the Harvard Medical School, and continued his studies on gregarines; Mr. C. A. Crowell made interesting discoveries on the growth of the ovum in reptiles; Mr. H. S. Davis worked on spermatogenesis, and Mr. J. M. Johnson on the nervous system of one of the Entomostraca; Mr. A. W. Peters, in connection with his studies on the metabolism of Infusoria, devised some valuable apparatus and methods for rearing and handling minute organisms, a description of which has been published as No. 124 of the Contributions. The work of Mr. P. E. Sargent on Reissner's Fibre has been continued, and a second preliminary paper, No. 122 of the Contributions, published; that of Mr. W. A. Willard was nearly completed, and promises to be a valuable contribution to the knowledge of cranial nerves.

Mr. C. W. Woodworth has completed an extensive work on "The Wing Veins of Insects." He returns next year to the chair of Entomology in the University of California. Mr. Willard has assumed for next year the duties of the professor of biology in Grinnell (Iowa) College, who goes abroad for a year's study.

In June, 1901, the degree of Doctor of Philosophy was conferred upon the three following candidates in Zoölogy: Mr. Maurice Alpheus Bigelow, whose thesis was entitled "The Early Development of Lepas, a Study of Cell Lineage and Germ Layers;" Mr. Robert William Hall, thesis, "The Development of the Mesonephros and the Müllerian Ducts in Amphibia;" and Mr. Reuben Myron Strong, thesis, "The Development of Color in the Definitive Feather." Dr. Bigelow holds the position of Instructor in Biology in the Teachers' College, Columbia University, and Dr. Hall that of Assistant in Biology in Yale University. Dr. Strong takes a position in the Chicago University Academy, Morgan Park, Ill.

Dr. Charles W. Prentiss has been appointed, upon the recommendation of the Division of Biology, to a Parker Fellowship for the year 1901-02, and has already sailed for Europe, where he will pursue zoölogical investigations.

The income of the Virginia Barret Gibbs Scholarship for 1900-01 was divided between two students, Mr. Frederic W. Carpenter and Mr. Julius M. Johnson, both registered in the Graduate School. Thirteen persons, instructors and advanced students, have availed themselves of the opportunity for study afforded by the Laboratory of the U. S. Fish Commission at Wood's Hole. Of these, nine have received aid from the income of the Humboldt Fund.

The meetings of the Zoölogical Club were held as usual throughout the year from 4.30 to 6 o'clock, but on Friday afternoons instead of Thursday, as in the preceding year.

Since the last report was made, Contributions Nos. 113-125 have been published. Appended is a list of—

*Contributions from the Zoölogical Laboratory for the Academic Year
1900-01.*

113. BOWERS, MARY A.—Peripheral Distribution of the Cranial Nerves of *Spelerves bilineatus*. Proc. Amer. Acad. Arts and Sciences, Vol. 36, No. 11, pp. 177-193. 2 pls. October, 1900.

114. FOLSOM, J. W.—The Development of the Mouth-Parts of *Anurida maritima* Guér. Bull. Mus. Comp. Zoöl., Vol. 36, No. 5, pp. 85–157. 8 pls. October, 1900.
115. PARKER, G. H., and BURNETT, F. L.—The Reactions of Planarians, with and without Eyes, to Light. Amer. Jour. Physiol., Vol. 4, No. 8, pp. 373–385. 4 figs. December, 1900.
116. YERKES, R. M.—Reaction of Entomostraca to Stimulation by Light. II. Reactions of *Daphnia* and *Cypris*. Amer. Jour. Physiol., Vol. 4, No. 8, pp. 405–422. 6 figs. December, 1900.
117. GALLOWAY, T. W.—Studies on the Cause of the Accelerating Effect of Heat upon Growth. Amer. Naturalist, Vol. 34, No. 408, pp. 949–957. 6 figs. December, 1900.
118. PARKER, G. H.—Correlated Abnormalities in the Scutes and Bony Plates of the Carapace of the Sculptured Tortoise. Amer. Naturalist, Vol. 35, No. 409, pp. 17–24. 5 figs. January, 1901.
119. YERKES, R. M.—A Study of Variation in the Fiddler Crab, *Gelasimus pugillator* Latr. Proc. Amer. Acad. Arts and Sciences, Vol. 36, No. 24, pp. 415–442. 3 figs. April, 1901.
120. PARKER, G. H., and ARKIN, L.—The Directive Influence of Light on the Earthworm *Allolobophora foetida* (Sav.). Amer. Jour. Physiol., Vol. 5, No. 3, pp. 151–157. 1 fig. April, 1901.
121. STRONG, R. M.—A Quantitative Study of Variation in the Smaller North-American Shrikes. Amer. Naturalist, Vol. 35, No. 412, pp. 271–298. 8 figs. April, 1901.
122. SARGENT, P. E.—The Development and Function of Reissner's Fibre, and its Cellular Connections. Proc. Amer. Acad. Arts and Sciences, Vol. 36, No. 25, pp. 443–452. 2 pls. April, 1901.
123. PRENTISS, C. W.—The Otoecyst of Decapod Crustacea: Its Structure, Development, and Functions. Bull. Mus. Comp. Zoöl., Vol. 36, No. 7, pp. 165–251. 10 pls. July, 1901.
124. PETERS, A. W.—Some Methods for Use in the Study of Infusoria. Amer. Naturalist, Vol. 35, No. 415, pp. 553–559. 2 figs. July, 1901.
125. PRENTISS, C. W.—A Case of Incomplete Duplication of Parts and Apparent Regulation in *Nereis virens* Sars. Amer. Naturalist, Vol. 35, No. 415, pp. 563–574. 6 figs. July, 1901.

REPORT ON THE LABORATORIES OF GEOLOGY AND GEOGRAPHY.

BY ASSISTANT PROFESSOR ROBERT DE C. WARD.

THE instruction given in this Department during the academic year 1900-01 was essentially the same as during the preceding year, with the exception of the usual changes involved in the bracketing and unbracketing of certain courses given in alternate years, and the addition of a new course in Meteorology (Geology 1). Eighteen courses and half-courses were given in the lecture room and laboratories of the Museum of Comparative Zoölogy by Professors Shaler and Davis, Assistant Professors R. T. Jackson, Ward and Woodworth, and Drs. T. A. Jaggar, Jr., and R. A. Daly. Mr. J. E. Woodman assisted in Courses 4, 5, and 8; Mr. H. C. Boynton, Austin Teaching Fellow in Geology, in Courses 5 and 16; Mr. R. W. Stone in 14^a, and Mr. F. M. Wilder in B. In addition, Messrs. G. C.

Johnson, L. H. Woolsey, J. W. Goldthwaite, W. L. Estabrook and C. T. Whitney served as student-assistants in the laboratory and field work of Geology 5, under Professor Woodworth's direction.

In the spring of 1901 the Governor of Massachusetts, and the Council, voted to deposit in the geological exhibition rooms, in the new south wing of the Museum, the large model of the Metropolitan District of Boston which was exhibited at the Paris Exposition. This model was constructed by Mr. G. C. Curtis, a former student in this Department.

Courses.		Students.	
Geology A		74	4
" B		104	8
" 1		12	
" 5		164	10
" 6		27	8
" 8		19	
" 11		20	3
" 14		60	
" 14 ^a		12	
" 15		2	
" 16		14	3
" 17		7	
" 19		6	
" 20		4	
" 22		9	
" 23		2	
" 24		1	
" 25		2	
Totals 18		548	36

Italics indicate students of Radcliffe College.

A number of the advanced students in field geology passed creditably the United States Civil

Service Examination for the position of Assistant Geologist on the U. S. Geological Survey, held April 23 and 24, 1901, and were at once given field employment in Pennsylvania, Alaska, Massachusetts and elsewhere. Some of these students were graduates of Course 22 only, others of both Courses 22 and 23. It is worthy of note that of the 46 successful applicants for this examination from all over the United States, 14 had received academic and graduate instruction at Harvard.

Professor Davis has conducted the advanced course in Physiography (Geology 20) throughout the year, and the half course on the Physiography of the United States (Geology 6) through the second half-year; both courses having been carried on in the same way as heretofore. One student in the advanced course, Mr. A. W. G. Wilson, having spent the previous summer in field work in Ontario, completed his thesis on the Physical Geology of Central Ontario during the winter, and received the degree of Ph.D. in Physical Geology at Commencement; he has since then been appointed to a position on the Geological Survey of Canada. Another student, Mr. G. D. Hubbard, made special studies on fiords and on certain other coastal features; he has been appointed instructor in physiography at the State Normal School, Charleston, Ill. Prof. C. F. McFarlane, of the State Normal College, Ypsilanti, Mich., spent part of the second half-year in Cambridge, studying with special relation to Physiography. A fourth student, Mr. L. M. Prindle, spent the summer in field work on Sierra La Sal, Colorado, accumulating material for a petrographic and physiographic thesis. Professor Davis gave much time in the first half-year to the preparation of an account of his excursion to the Colorado cañon, of the previous summer; the report has been published in the Bulletin of the Museum. During the spring he has undertaken special studies of river terraces in New England, and will publish an essay on that subject. In the summer he made a second excursion to the Colorado cañon in Arizona, with special reference to the unconformities there exhibited on a large scale.

The summer course in Geography was given on the same lines as in previous years by Mr. H. T. Burr, a recent Harvard graduate and at present instructor in the State Normal School, New Britain, Conn. He was assisted by Mr. C. H. Morrill. Professor Davis gave six lectures in the first week of the course. The number of students was 22.

Prof. R. T. Jackson gave his usual courses in Palæontology during the year. He reports that the palæontological teaching collections are in good condition. No important additions of material have been received during the past year. A microscope with accessories was purchased of Bausch and Lomb; also objectives and eyepieces for two old stands. It is hoped next year to purchase two new stands to replace the old ones, when the Department will be fairly well equipped in this direction.

Professor Ward conducted the elementary course in Meteorology (Geology B) and the two half-courses in Climatology (Geology 19 and 25) as in previous years. A new intermediate half-course in Meteorology (Geology 1) was given during the first half-year for the first time, and was taken by 12 students. One graduate student in the course in General Climatology (Geology 19), Mr. G. D. Hubbard, made a special study of the Meteorological Conditions of the Antarctic, and his thesis was published in the *Journal of School Geography* for June, 1901, pp. 161-170. Another graduate student, Mr. R. M. Brown, undertook a study of the Effects of Climate on Railroad Construction and Operation, the results of which will also be published. The most important additions to the laboratory materials for use in the courses in Meteorology and Climatology were two large-scale colored charts, one of equal annual ranges of temperature and one of mean annual rainfall; a number of new mounted and colored maps, illustrating the climate of the United States, for use in Geology 25, and a number of photographic enlargements of text-book diagrams for class use. Professor Ward has continued his work on the English translation of Hann's *Handbuch der Klimatologie*, which will be published in 1902.

Prof. J. B. Woodworth gave instruction in four courses to Harvard students and in two courses to Radcliffe students. One advanced student carried on field-work during the year upon the glacial sand-plains of the Framingham atlas-sheet with a view to the determination of the conditions under which the ice-sheet disappeared from the Sudbury River Valley. The number of students attending these courses is set forth in the tabulated statement on page 12. A number of rocks and structures required for teaching were purchased during the year. Mr. H. C. Boynton, Austin Teaching Fellow in Geology, gave a part of his time to rearranging and classifying the accumulation of reserved rock

specimens in the laboratory collections. Mr. Y. G. Bergen donated a number of volcanic rocks and minerals collected by him in the district about Naples, Italy.

The heirs of the late Dr. C. T. Jackson presented Professor Woodworth with several instruments, geological models, and charts, once used by that well-known geologist. Most of these materials have been given to the Division of Geology, or deposited for its use.

Professor Woodworth was granted a leave of absence by the Acting President of the University in February to attend the Richmond, Va., meeting of the American Institute of Mining Engineers as a representative of the U. S. Geological Survey. He has continued to act during the year as an assistant of the N. Y. State Museum, engaged in an investigation of the Pleistocene geology of the Hudson and Champlain Valleys. Reports on this work have been prepared for publication. A special report on the Triassic coal areas of the Atlantic slope was also prepared for the U. S. Geological Survey, and an article on the geological conditions of mining in the Richmond area was prepared at the request of the Director of the U. S. Geological Survey for the American Institute of Mining Engineers.

Mr. Woodman continued during the year his work upon a report on the geology of parts of Nova Scotia. With Professor Shaler, he also gave an elementary course in geology in the Summer School, which was attended by 12 students. Mr. Boynton engaged during the summer vacation in mining exploration in the region north of Lake Superior.

Course 22, advanced geological field work, under Dr. T. A. Jaggar, doubled its attendance from five students in 1899-1900 to ten in 1900-01. The work accomplished by the class was an accurate geological map of the Middlesex Fells, made on a large scale topographical base of the Metropolitan Park Commission. The same plan was followed as in 1899-1900, the students mapping an area in the fall and investigating a topic in the spring. It was found advantageous to have them work in the field in pairs. The work of this class is now definitely organized for eventual publication by the United States Geological Survey. An appropriation for compiling the work has been made, and the preparation of a geological folio comprising the Boston and Boston Bay quadrangles assigned to Dr. Jaggar by the Director of the Survey.

Mr. A. W. G. Wilson completed during the year, for publication by the Boston Society of Natural History, his work on the Geology of the Medford Dike. Mr. R. W. Stone, in Course 23, made a field experimental study of Erosion Movements in the Mystic Valley, and supplemented this in the spring by a series of laboratory experiments on erosion in miniature, which were successful. During the winter a paper on the intrusive character of the melaphyr of Brighton, by H. T. Burr, was published by the Museum of Comparative Zoölogy.

Course 17, Experimental Geology, was given to seven students. The laboratory accommodations were extended, and the series of laboratory experiments made more systematic and thorough than heretofore. New experiments were made on erosion, joints, and deformation of strata. There is need of a small outbuilding for high temperature experiments, remote from danger by fire, and it has been suggested that the small building on Jarvis Street, recently used by the Department of Architecture, would well serve this purpose.

Dr. Jaggar has been appointed, for the U. S. Geological Survey, Assistant Geologist in charge of the Bradshaw Mts. Quadrangle of Northern Arizona. Dr. Palache was appointed his associate in the work of mapping and studying the economic geology of this copper and gold mining district.

Dr. R. A. Daly spent the summer of 1900 in a geographical and geological reconnaissance of the northeast coast of Labrador, a report of which will appear as a bulletin of the Museum. During the first half-year, he conducted the elementary course in Physiography (Geology A) and in the second half-year the course on Oceanography (Geology 11). Dr. Daly also gave a course of lectures in Radcliffe College on the Physiography of the United States (Geology 6) which was parallel to the course in the same subject given by Professor Davis to students of Harvard University. A beginning was made on the petrographic study of the collections of volcanic island rocks from the Pacific, now systematically arranged in this Museum. In June 1901, Dr. Daly tendered his resignation to the President of the University, in order to assume the position of geologist on the Canadian Commission appointed to remark the boundary between the United States and Canada.

The committee on the Gardner Collection of photographs (Professors Woodworth and Ward, and Dr. Daly) report that 432

prints have been added since the last report, making the total number catalogued 4875. One hundred and seven stereopticon views were added during the year, making the number in the collection 3,006. The principal additions during the year were a set of Wyoming views purchased of Prof. Wilbur C. Knight; 80 Austrian views purchased from Alais Beer of Klagenfurt; a number of views, with lantern slide copies, of Southeastern Massachusetts, the gift of John L. Gardner, Jr., and a set of Norwegian views purchased by means of an anonymous gift of \$100. A limited use of the uncopied negatives belonging to the collection has been made by students desiring to provide themselves with lantern slides for teaching geography and geology. Mr. Woodman continued during the year the cataloguing and care of the collection. The committee is greatly indebted to Dr. Hans Reusch, of Christiania, Norway, for valuable assistance in facilitating the purchase of the Norwegian views above referred to, and to Professor Knight of Laramie, Wyoming, for making provision for the purchase of prints and lantern slides of the Union Pacific Railway expedition views taken in 1899.

The following Publications by Officers of the Department were issued during the Year.

By W. M. DAVIS.

Notes on the Colorado Cañon District. Amer. Journ. Sci., X. 1900.
pp. 251-259.

An Excursion to the Grand Cañon of the Colorado. Bull. Mus. Comp. Zool., XXXVIII. 1901. pp. 107-201.

An Excursion in Bosnia, Herzegovina, and Dalmatia. Bull. Geogr. Soc. Phila., III. 1901. pp. 21-50.

The Geographical Cycle. Verh. VII. Internat. Geogr. Kongr., Berlin. 1900. II. 221-231.

Physical Geography in the High School. School Review, VIII. 1900.
pp. 388-404, 449-456.

Practical Exercises in Physical Geography. Proc. V. Ann. Conf. N. Y. State Teachers and Science Teachers Assoc. 1901.

The Causes of Rainfall. Journ. N. E. Water Works Assoc., XV. 1901. pp. 338-350.

Geographical Bibliography for the United States. Ann. de Géogr., Xme Bibl. Géogr. Annuelle. 1900.

Current Notes on Physiography. Science.

By R. DE C. WARD.

Current Notes on Meteorology in Science throughout the year. Reviews in Science, Journal of School Geography, Annales de Géographie, and Harvard Graduates' Magazine.

By J. B. WOODWORTH.

Original Micaceous Cross-Banding of Strata by Current Action. Amer. Geol., XXVII. 1901. pp. 281-283.

By T. A. JAGGAR, JR.

The Laccoliths of the Black Hills; with a chapter on Experiments in Intrusion and Erosion by Ernest Howe. XXI. Ann. Rept. Director U. S. Geol. Survey. 1901. Part III. pp. 163-303.

By R. A. DALY.

The Physiography of Acadia. Bull. Mus. Comp. Zoöl. Vol. XXXVIII. March, 1901. pp. 73-104. 11 plates.

Notes on Oceanography. Science. Nov. 2, 1900, and June 14, 1901.

REPORT ON THE MAMMALS.

BY OUTRAM BANGS.

THE collections of Mammals now in the possession of the Museum have been incorporated in a single series and a large collection of duplicates has been separated for purposes of exchange. Many of the duplicates are topotypes of forms I have described. A system of exchanges has already been inaugurated which promises to bring to the Museum much material not now represented in the collections. Every effort is being made to make the collection a representative study series of the Mammalia of the world, and it is hoped that the collection will soon take its place among those of the larger Museums. Many of the old skins have been made over, the skulls removed and cleaned, so that it can be said that nearly all of the material is in modern form and in first-class condition. A number of air-tight storage cases of an improved form have been constructed which have proven most satisfactory.

The accessions to the collections are as follows:—

The Bangs collection, mostly North American, numbering about ten thousand specimens. Eight specimens from the Liu Kiu Islands, including one type; purchased. Twenty-one specimens of *Putorius*, *Dicrostonyx*, and *Lemmus* from Point Barrow, Alaska, from E. A. McIlhenny; purchased. Sixty-two skins collected by W. W. Brown, Jr., in Divala Chirigui, Central America; presented by Messrs. E. A. and O. Bangs. Eleven skins from San Julian, Venezuela; presented by Capt. Wirt Robinson, U. S. A. Three hundred and thirty skins collected by W. W. Brown, Jr., in the Cordillera de Chirigui; presented by Messrs. E. A. and O. Bangs. Other gifts have been given by A. G. Dorr, R. H. Howe, Jr., C. P. Jaynes, J. C. Shattuck, and Commander J. F. Moser, U. S. N.

Material has been loaned to J. A. Allen, G. M. Allen, M. W. Lyon, Jr., C. Hart Merriam, G. S. Miller, Jr., E. W. Nelson, and E. A. Preble.

I have published during the year:—

In the Auk:—

Birds of San Miguel Island, Panama. Vol. XVIII. pp. 24-32. 1901.

A new ground Dove from Western Mexico. Vol. XVIII. pp. 257-258. 1901.

In the American Naturalist:—

Notes on a small collection of Mammals from the Liu Kiu Islands. Vol. XXXV. pp. 561-562. 1901.

In the Bulletin Museum of Comparative Zoölogy. Vol. XXXVI. pp. 255-269. 1901.

On a collection of Birds from the Liu Kiu Islands.

In Proceedings of the New England Zoölogical Club:—

Description of a New Squirrel from Panama. Vol. II. pp. 43-44. 1900.

Three new Rodents from Southern Labrador. Vol. II. pp. 35-41. 1900.

List of Birds collected by W. W. Brown, Jr. at Loma del Leon, Panama. Vol. II. pp. 13-34. 1900.

A new Honey Creeper from San Miguel Island, Panama. Vol. II. pp. 51-52. 1901.

A new Meadowlark from South America. Vol. II. pp. 55-56. 1901.

A new Ortalis from the Archipelago de las Perlas, Bay of Panama. Vol. II. pp. 61-62. 1901.

On an apparently unnamed race of *Buteo borealis*. Vol. II. pp. 67-69. 1901.

A new Phaëthornis from the Santa Marta Region of Colombia. Vol. II. pp. 63-65. 1901.

Notes on the American Rough-winged Swallows, with Description of a new sub-species. Vol. II. pp. 57-60. 1901.

In Proceedings of the New England Zoölogical Club, in joint authorship with William Brewster:—

On an overlooked species of *Aithurus*. Vol. II. pp. 47-50. 1901.

Description of a new Bécard from Lower Uruguay. Vol. II. pp. 53-54. 1901.

In the Auk, in joint authorship with Thomas S. Bradlee. Vol. XVIII. 1901. pp. 249-257: —

The Resident Land Birds of Bermuda.

REPORT ON THE BIRDS.

BY WILLIAM BREWSTER.

DURING the past year the following bird skins have been purchased for the Museum: From Mr. Henry W. Henshaw, one hundred and forty-seven skins collected by him at Hilo, Hawaiian Islands; from the Flood Brothers, of Malden, Massachusetts, sixteen skins, eight of which were taken in the Hawaiian Islands and eight at Laysan Island; from Alan Owston, one hundred and seven skins obtained in the Liu Kiu Islands; from the Frank Blake Webster Company, ninety-seven skins of Chinese birds collected by J. H. Ingram, and an unidentified heron taken at Laguna Mindoro, Philippine Islands; from S. Dannefaernd, a pair of the "Wingless" Ducks (*Nesonetta aucklandica*) from Auckland Island.

The Museum has acquired by gift: From Mr. Walter Faxon a skin of the Willow Thrush (*Hylocichla f. salicicola*) taken at Lanesborough, Massachusetts, September 27, 1900, by Mr. Faxon; from Mr. R. H. Howe, Jr., Mr. G. C. Shattuck, and Mr. R. W. Gray, eighteen skins of North American Water Birds; from Mr. J. W. Freeze, a skin of the Yellow-billed Cuckoo; from Mrs. E. B. Durhamdon, a nest of the Chimney Swift.

One hundred and two skins of South American birds have been added to the collection by an exchange with Messrs. E. A. and Outram Bangs.

Early in the winter the large and valuable collection of Jamaican birds, presented to the Museum several years ago by Mr. Scott, was thoroughly examined. After all the specimens had been identified, and the duplicate as well as the imperfect skins weeded out, the collection was catalogued and relabelled by Miss Parker. Mr. Bangs was kind enough to assist in this work, and I am also indebted to him for supervising the remounting of some specimens

for the exhibition collections during my absence from Cambridge later in the year.

I have published during the year :—

In the Auk :—

On the Occurrence, in Massachusetts, of Certain Rare or Interesting Birds.

The Meadowlark (*Sturnella magna*) at Rangeley, Maine.

Bell's Vireo and the Sandhill Crane in New Hampshire.

In Proceedings of the New England Zoological Club, in joint authorship with Mr. Outram Bangs :—

On an overlooked species of *Aithurus*.

Description of a new Bécard from Lower Uruguay.

REPORT ON THE FISHES AND REPTILES.

BY SAMUEL GARMAN.

THE principal additions for the year to the collections in these departments were made by Alexander Agassiz, Señorita Barbara Eloisa Alvarez, Outram Bangs, A. N. Cheney, Leon Holcomb, Dr. G. G. Kennedy, Wm. D. McPherson, George Nelson, Dr. G. H. Parker, Wm. Royce, Wm. D. Ryder, John W. Titcomb, the United States Fish Commission, George Van Felson, and Alden P. White. The parcels received from the Fish Commission, and that from Mr. Bangs were especially comprehensive. A few mounted reptiles were purchased. Some material was turned over to instructors and students, and some was shipped to Professor Field, Dr. F. A. Lucas, Dr. L. Stejneger, and the Smithsonian Institution. Besides that taken in the ordinary work of care and identification, time has been given to improvements in the exhibition rooms, and in the arrangement and condition of the collections in the storage rooms. A considerable labor also, has been devoted to preparing forthcoming publications. The condition of both storage and exhibition series may be reported as good.

REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

BY SAMUEL HENSHAW.

ADDITIONS to the collection, for which thanks are due, have been received from Miss Isabella Batchelder, Miss H. S. Clark, Miss C. H. Clarke, Miss S. C. Fogg, Miss B. T. Parker, Miss C. G. Soule, Miss Gertrude A. Thurston and from Messrs E. P. Austin, A. L. Babcock, Outram Bangs, Frederick Blanchard, G. W. Blodgett, E. E. Bogue, E. L. Bouvier, F. C. Bowditch, T. S. Bradlee, R. S. Breed, Henry Brooks, Charles Bullard, August Busch, C. L. Crehore, Walter Deane, J. H. Emerton, W. G. Farlow, A. Fenyes, W. L. W. Field, J. W. Folsom, J. W. Freese, F. D. Godman, Roland Hayward, Ralph Hoffmann, J. G. Jack, Frank Lufkin, E. L. Mark, A. L. Melander, J. H. H. McNamee, A. P. Morse, J. G. Needham, A. S. Packard, Wirt Robinson, A. B. Seymour, E. J. Smith, J. B. Smith, O. O. Stover, Roland Thaxter, O. S. Westcott, W. M. Wheeler, R. H. Wolcott, Walter Woodman, and C. W. Woodworth.

Especial mention and record should be made of Mr. Emerton's gift of New England and Canadian spiders. In a series of papers published in the Transactions of the Connecticut Academy from 1882-1891 Mr. Emerton enumerated 344 New England forms, including 174 new species, and 100 Canadian species with 18 described as new. The specimens presented include all of the New England species, and 35 of the Canadian, and of the new species the types of all but one.

Mr. Wheeler's gift of a series of identified ants is also noteworthy.

The condition of the whole collection is excellent.

The work done upon the collection has been confined chiefly to the Lepidoptera; more than 100 boxes have been rearranged, and the incorporation of the large series of Rhopalocera received from the F. H. Sprague collection has been completed. The greater part of the material from the Sprague collection in groups other than the Rhopalocera has been distributed.

REPORT ON THE CRUSTACEA AND MOLLUSCA.

BY WALTER FAXON.

SINCE the last Annual Report was printed, Miss E. B. Bryant has finished labelling and entering in the Museum Catalogue the collection of shells received from R. E. Call in 1898. A brief notice of this collection (which makes 5,778 entries in the catalogue) will be found in the Annual Report for 1897-98. The incorporation of such a large amount of material with the old collection has necessitated the rearrangement of the whole. The Unionidæ alone now occupy 358 of the large Museum sliding-trays. In the rearrangement of the Unionidæ I have followed the system of Simpson's "Synopsis of the Naides," 1900. Five hundred and sixty-four species of Naides are represented in our collection.

For gifts to the department during the past year the Museum owes thanks to Messrs. T. D. Cockerell, C. B. Davenport, F. D. Godman, R. T. Jackson, and E. B. Williamson. Mr. Godman's contribution consists of a lot of Land Mollusks from Central America, part of the material worked up by Von Martens for the "Biologia Centrali-Americana."

Mr. W. P. Hay has lately spent two weeks in the study of the Museum collection of Astacidæ.

REPORT ON THE DEPARTMENT OF VERTEBRATE
PALÆONTOLOGY.

BY CHARLES R. EASTMAN.

AN extended collecting trip undertaken by the Assistant during the late summer and fall of 1900, resulted in substantial benefit to the Department. A number of very excellent Triassic fishes were secured from the vicinity of Boonton, New Jersey, where excavations for a reservoir had opened up a large area of fossiliferous strata. An account of this locality, with illustrations of the leading species of *Semionotus* there occurring, appeared in a recent number of a popular magazine. In the same way, advantage was taken of the operations for reducing the grade along the Union Pacific Railroad west of Green River, and elsewhere in Wyoming, to obtain a representative suite of Green River (Eocene) fishes. The work of the Assistant being unfortunately interrupted at this point, arrangements have been made for resuming the field during the present season in co-operation with several western geologists and collectors. Among the more interesting specimens obtained by purchase, should be mentioned a perfect example each of *Lepidosteus simplex* Leidy, and *Xiphotrygon acutidens* Cope (*Helicobatis radians* Marsh), from the Green River Eocene of Fossil, Wyoming; also a skull of the interesting Chelydroid, *Toxochelys latiremus* Cope, from the Niobrara Cretaceous of western Kansas. A fine skeleton of *Hesperornis* from the Kansan Cretaceous was offered to the Museum for purchase, but not upon such terms that it could be accepted. No additions of consequence have been made to the Mammalian series during the year. A visit was made by Professor H. F. Osborn during the spring for the purpose of studying the collection of fossil Titanotheres.

Additions to the Collection during the Year.

1900. A collection of sharks' teeth and cetacean otolites dredged from the bottom of the Pacific ocean by the Albatross Expedition of 1899-1900. Received June 1.

1900. Kinnear collection. A number of fossil fishes from the Old Red Sandstone of Scotland, collected by William T. Kinnear, of Forss by Thurso. Purchased.

1900. A collection of Triassic fishes from the vicinity of Boonton, New Jersey, in part collected by the Assistant, and in part purchased. Received September 19.

1900. Cast of type-specimen of *Sagenodus copeanus* Will., from the Coal Measures of Brown County, Kansas. Presented by Dr. S. W. Williston, of Lawrence, Kansas.

1900. A collection of Green River fishes from various Eocene localities in Western Wyoming, in part collected by the Assistant, and in part purchased; including perfect examples of *Lepidosteus simplex* Leidy, *Xiphotrema acutidens* Cope, and numerous teleost fishes.

1900. Mammoth tooth from Colorado Springs, Colorado. Presented by Horace E. Pastorius, of Philadelphia, Pa.

1900. A collection of Upper Devonian fish-teeth, from the State Quarry Beds near North Liberty, Johnson County, Iowa. Purchased.

1900. A collection of Subcarboniferous fish-teeth from the Keokuk Limestone near Burlington, Iowa. Purchased. Also a collection of fish-remains from the same horizon in Henry County, Iowa, collected and presented by Professor T. E. Savage, of Toledo, Iowa.

1900. St. John Collection. A magnificent collection of middle Devonian fish-remains from the Cedar Valley Limestone of Blackhawk and Bremer Counties, Iowa, collected between 1860 and 1873 by Orestes H. St. John, former Assistant in this Department. Deposited.

1901. Skull and mandible of *Toxochelys latiremus* Cope, from the Niobrara Cretaceous near Elkader, Kansas; collected by C. H. Sternberg. Purchased.

1901. *Mylostoma variabilis* Newberry. Counterpart of the unique specimen preserved in the museum of Columbia University, and described by Dr. Bashford Dean in Memoirs of the New York Academy of Sciences, Vol. II. (1901), p. 100, pl. viii.

1901. A collection of Carboniferous fish-remains from various localities in Nebraska, obtained in exchange with Professor E. H. Barbour, of the State University at Lincoln.

Papers published during the Year.

Upper Devonian Fish-Fauna of Delaware County, New York (17th Ann. Rept. N. Y. State Geol. for 1897, pp. 317-327), 1900.

The Eocene Fish-Fauna of Maryland (Maryland Geol. Surv., Eocene pp. 98-115), 1901.

Traquair's Presidential Address at the Bradford meeting, 1900 (Amer. Nat. Vol. XXXV. p. 327), 1901.

Dean's Palæontological Notes [Review] (Amer. Nat., Vol. XXXV. p. 418), 1901.

REPORT ON INVERTEBRATE PALÆONTOLOGY.

BY ALPHEUS HYATT.

THE Assistant has rearranged the large and difficult group of the Orthoceratidæ, and some advance has been made towards a revision of the species. In preparing a table to demonstrate the relations of the life histories of twenty-one types of ammonoids to the evolution of this order, he has incidentally made a number of preparations and revised the genera to which the types belonged. Some work has been done upon the exhibition specimens of palæozoic cephalopods, and these are now nearly complete.

A series of cases extending to the ceiling have been built upon the top of the wall cases in two of the four storage rooms, and the additional space thus gained is 632 trays.

An extraordinarily fine collection of fossil corals has been donated by Mr. Alexander Agassiz. The most important part of this was collected by Major W. J. Davis, of Louisville, Ky., from the Silurian and Devonian of the vicinity of that town, and especially at the falls of the Ohio River. The remainder was collected from the same region by Mr. Wm. J. McConathy, and consists of similar fine materials. These fossils are mostly silicified, and this enabled Major Davis to etch them out from the limestone matrix, and thus produce extremely perfect and often beautiful preparations of these interesting palæozoic corals. This collection has also had the benefit of relabelling and thorough revision by Major Davis himself, who spent two months in this work after the specimens were unpacked, and they have since been catalogued by Miss Bryant under Dr. Jackson's direction. It contains most of the originals of Major Davis's descriptions, published by the Geological Survey of Kentucky. There are over three hundred species, and twenty-four genera, represented by 1,789 catalogued lots, these for the most part consisting of suites of specimens.

Besides the corals there were a few miscellaneous fossils in the Davis and McConathy collection, the most valuable of which were the sponges and Beatricea.

Dr. Faxon turned into this department, from the Department of Conchology, the Silurian and Tertiary fossils received from the R. E. Call collection. The Tertiary material, consisting mainly of Mollusca, is very fine.

Two fossil jelly fishes from the Lithographic Slates, Solenhofen, *Rhizostomites admirandus* and *lithographicus*, have been purchased, and also two rare specimens of Emperoceras, showing the extraordinarily complex metamorphoses of the species of this curious genus of cephalopods.

The department is indebted to Dr. R. T. Jackson for miscellaneous work, and for some time spent upon the rearrangement of gasteropods and trilobites. Dr. A. W. Grabau studied the fossil Fusidæ while preparing his thesis.

The following papers were published :—

Some Governing Factors usually neglected in Biological Investigations. By Alpheus Hyatt. Biol. Lecture of Marine Biol. Laboratory, Wood's Hole 1899. 8vo. pp. 127-156.

Cephalopoda, in Zittel's Text-Book of Palæontology, Eastman's Translation. By the same. Macmillan. 8vo. Vol. I. pp. 502-592, wood-cuts 1049 to 1235.

Ink and Paper for Museum Labels. By Dr. R. T. Jackson. Report of Museum's Association 1899.

REPORT ON THE LIBRARY.

BY SAMUEL HENSHAW.

FROM July 1, 1900, to July 31, 1901, 862 volumes, 3,570 parts of volumes, 1,473 pamphlets, and 57 maps have been added to the library.

On the basis of past data, the library contains 33,329 volumes and 25,819 pamphlets.

These figures, owing to the exclusion of duplicates, the transfers to other libraries of the University, and the complete enumeration of the Whitney books, will be somewhat modified in the next report.

693 volumes have been bound; 500 pamphlets have been separately bound.

The rearrangement of the library completed during the year includes:—1st, the geological books, with the exception of a part of the Whitney Library; 2d, the zoölogical and palæozoölogical books and serials; 3d, the general serials; and 4th, the serial publications of institutions.

The shelf catalogue of the library as rearranged is well advanced.

By a vote of the Library Council of the University somewhat more than 500 books and pamphlets have been transferred from Gore Hall to the library of the Museum.

[A]

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOOLOGY

FOR THE ACADEMIC YEAR 1900-1901.

Bulletin:—

Vol. XXXVI.

- No. 5. Contributions from the Zoölogical Laboratory. No. 114. The Development of the Mouth-parts of *Anurida maritima* Guér. By JUSTUS WATSON FOLSOM. 73 pp. 8 Plates. October, 1900.
- No. 6. Reports on the Dredging Operations off the West Coast of Central America to the Galapagos, to the West Coast of Mexico, and in the Gulf of California, in Charge of Alexander Agassiz, carried on by the U. S. Fish Commission Steamer "Albatross," during 1891, Lieut. Commander Z. L. Tanner, U. S. N. Commanding. XXVIII. Description of two new Lizards of the Genus *Anolis* from Cocos and Malpelo Islands. By LEONHARD STEJNEGER. 6 pp. 1 Plate. November, 1900.
- No. 7. Contributions from the Zoölogical Laboratory. No. 123. The Otocyst of Decapod Crustacea: Its Structure, Development, and Functions. By C. W. PRENTISS. 87 pp. 10 Plates. July, 1901.
- No. 8. On a Collection of Birds from Liu Kiu Islands. By OUTRAM BANGS. 17 pp. July, 1901.

Vol. XXXVIII. Geological Series, Vol. V.

- No. 1. Notes on the Limestones and General Geology of the Fiji Islands, with special reference to the Lau Group. Based upon Surveys made for Alexander Agassiz. By E. C. ANDREWS. With a Preface by T. W. EDGEWORTH DAVID. 50 pp. 40 Plates. November, 1900.
- No. 2. The Structural Relations of the amygdaloidal Melaphyr in Brookline, Newton, and Brighton, Mass. By HENRY T. BURR. 19 pp. 2 Plates. March, 1901.
- No. 3. The Physiography of Acadia. By REGINALD A. DALY. 34 pp. 11 Plates. March, 1901.
- No. 4. An Excursion to the Grand Cañon of the Colorado. By W. M. DAVIS. 97 pp. 2 Plates. May, 1901.

Report:—

1899-1900. 41 pp. January, 1901.

[B]

INVESTED FUNDS OF THE MUSEUM.

IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE, SEPT. 1, 1901.

Sturgis-Hooper Fund	\$100,000.00
Gray Fund	50,000.00
Agassiz Memorial Fund	297,933.10
Teachers and Pupils Fund	7,594.01
Permanent Fund	117,469.34
Humboldt Fund	7,740.66
Virginia Barret Gibbs Fund	5,000.00
Willard Peele Hunnewell Memorial Fund	5,000.00
	<hr/>
	\$590,737.11

The payments on account of the Museum are made by the Bursar of Harvard College, on vouchers approved by the Keeper. The accounts are annually examined by a committee of the Overseers. The only funds the income of which is restricted, the Gray and the Humboldt Funds, are annually charged in an analysis of the accounts, with vouchers to the payment of which the income is applicable.

The income of the Gray Fund can be applied to the purchase and maintenance of collections, but not for salaries.

The income of the Virginia Barret Gibbs Scholarship Fund, of the value of \$250, is assigned annually with the approval of the Faculty of the Museum, at the recommendation of the Professor of Zoölogy and of Comparative Anatomy in Harvard University, "in supporting or assisting to support one or more students who have shown decided talents in Zoölogy, and preferably in the direction of Marine Zoölogy."

The income of the Humboldt Fund (about \$300) can be applied for the benefit of one or more students of Natural History, either at the Museum, the United States Fish Commission Station at Wood's Hole, or elsewhere.

Applications for the tables reserved for advanced students at the Wood's Hole Station should be made to the Faculty of the Museum before the 1st of May. Applicants should state their qualifications, and indicate the course of study they intend to pursue.

The following Publications of the Museum of Comparative Zoölogy
are in preparation:—

Reports on the Results of Dredging Operations in 1877, 1878, 1879, and 1880, in charge of ALEXANDER AGASSIZ, by the U. S. Coast Survey Steamer "Blake," as follows:—

- E. EHLERS. The Annelids of the "Blake."
C. HARTLAUB. The Comatulæ of the "Blake," with 15 Plates.
H. LUDWIG. The Genus *Pentaerinus*.
A. MILNE EDWARDS and E. L. BOUVIER. The Crustacea of the "Blake."
A. E. VERRILL. The Alcyonaria of the "Blake."

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of ALEXANDER AGASSIZ, on the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding.

Illustrations of North American MARINE INVERTEBRATES, from Drawings by BURKHARDT, SONREL, and A. AGASSIZ, prepared under the direction of L. AGASSIZ.

- LOUIS CABOT. Immature State of the Odonata, Part IV.
E. L. MARK. Studies on *Lepidosteus*, continued.
" On *Arachnactis*.

- R. T. HILL. On the Geology of the Windward Islands.
W. McM. WOODWORTH. On the Bololo or Palolo of Fiji and Samoa.
A. AGASSIZ and A. G. MAYER. The Acalephs of the East Coast of the United States.
AGASSIZ and WHITMAN. Pelagic Fishes. Part II., with 14 Plates.
J. C. BRANNER. The Coral Reefs of Brazil.

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer "Albatross," Lieutenant Commander Z. L. TANNER, U. S. N., Commanding, in charge of ALEXANDER AGASSIZ, as follows:—

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|---|--|
| A. AGASSIZ. The Pelagic Fauna. | H. LUDWIG. The Starfishes. |
| " The Echini. | J. P. McMURRICH. The Actinarians. |
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